Delta Carbon

Delta Conservancy Board of Directors Meeting

July 24, 2013

Steve Deverel, Ph.D., P.G., HydroFocus, Inc., Davis, CA

Participating Organizations

American Carbon Registry
Coastal Conservancy
Delta Conservancy
Department of Water Resources
Environmental Defense Fund
HydroFocus, Inc
The Nature Conservancy
.UC Berkeley
UC Davis
USGS

Objectives

- Today- share relevant current information

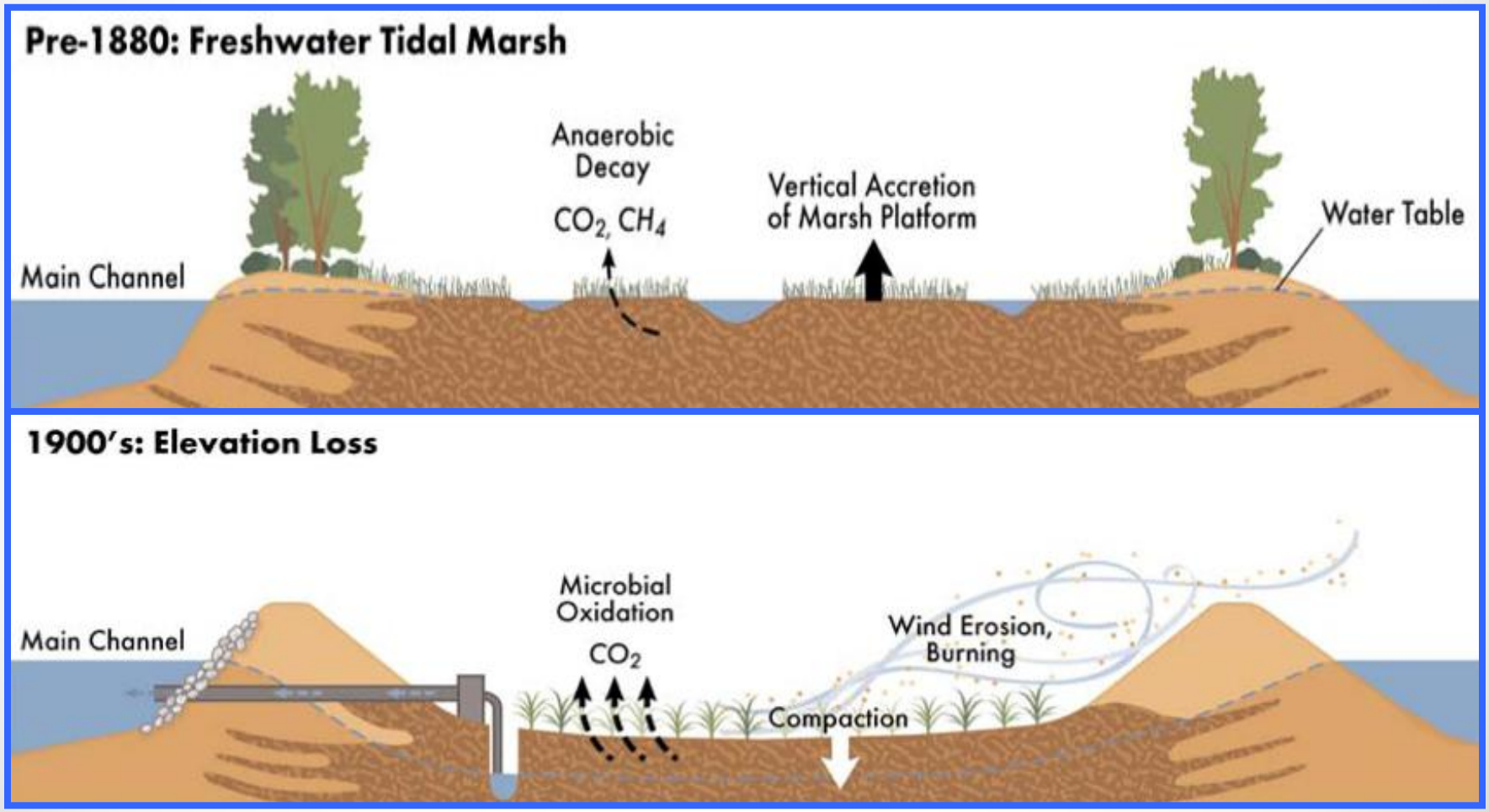
Overall

- Insure that stakeholders have the best possible input for making decisions about greenhouse gas benefit opportunities
- Create incentives and mechanisms for Delta greenhouse gas reduction
- Reduce risks

Overview

- Subsidence and carbon dioxide losses
- Carbon sequestration in managed wetlands
  - Accretion and carbon accumulation
  - Potential in Delta
- Economic benefit
- Rice
- Ongoing and planned activities
- Questions

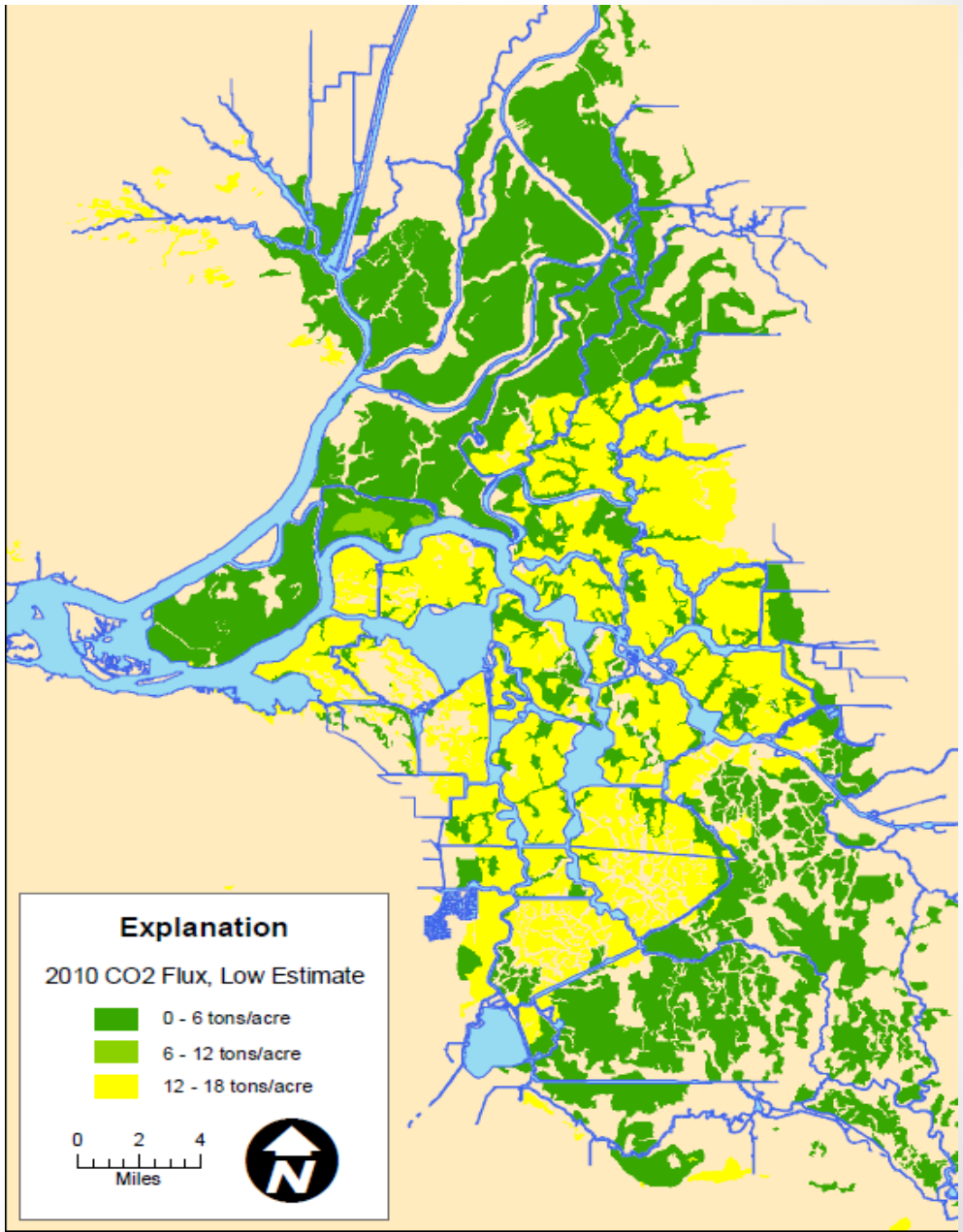
Subsidence & Carbon Loss



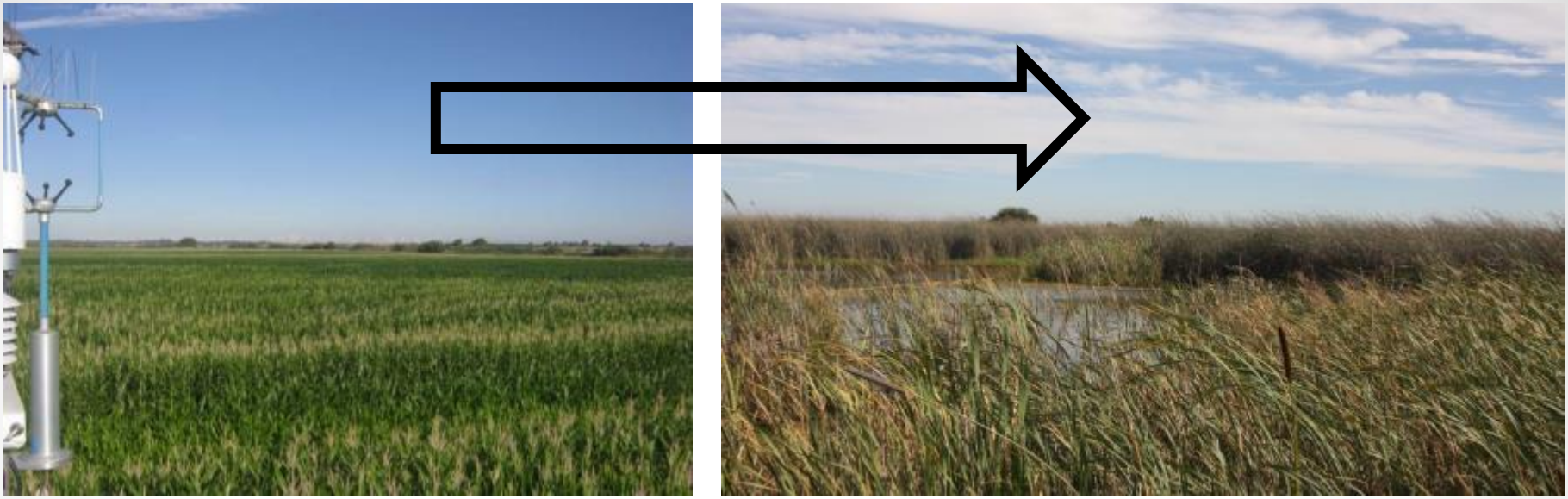
Consequences

Estimated CO_2 emissions

- Delta = ~ 1.5 to 2 million metric tons of CO_2/year
- Equal to annual emissions from 310,000 passenger vehicles
- and 0.5% of California's total emissions



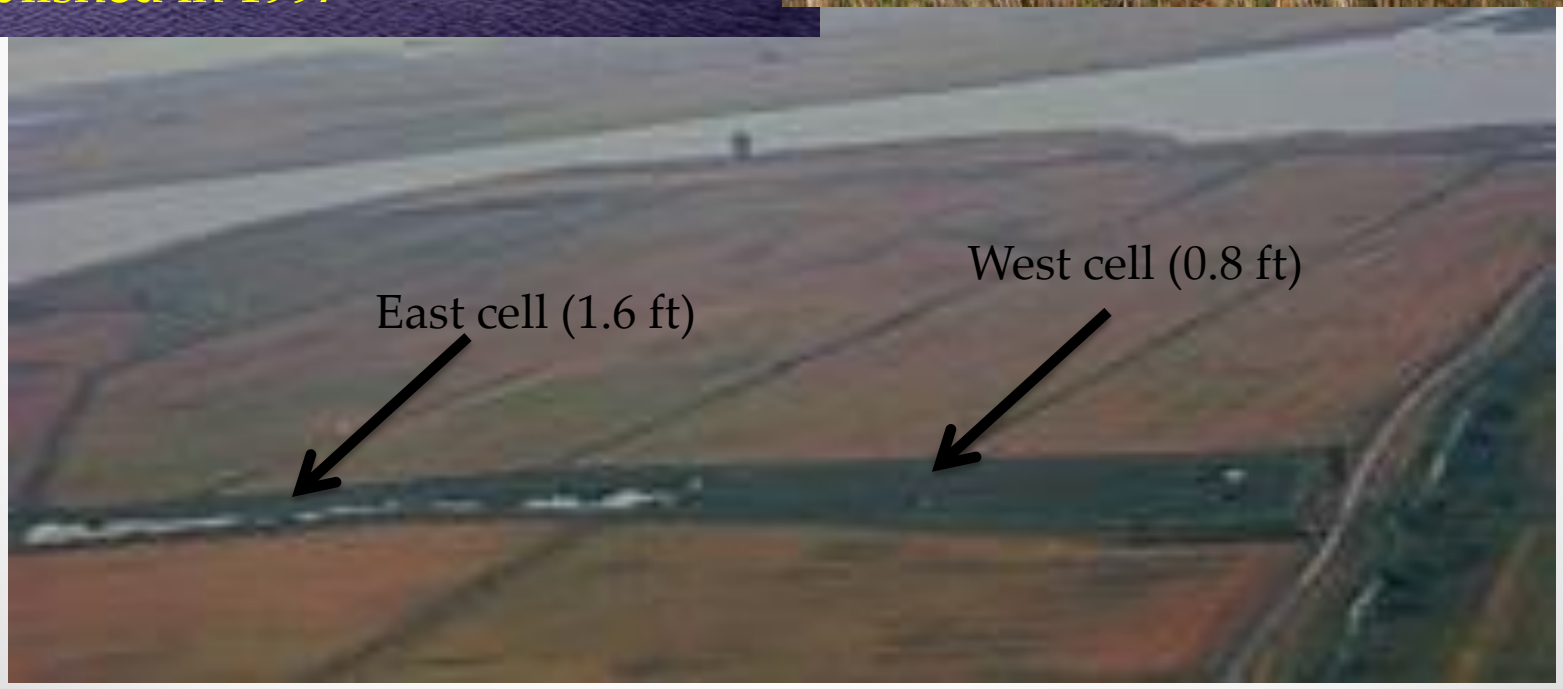
Future?



Flooding to create wetlands, reduce further carbon loss and sequester carbon

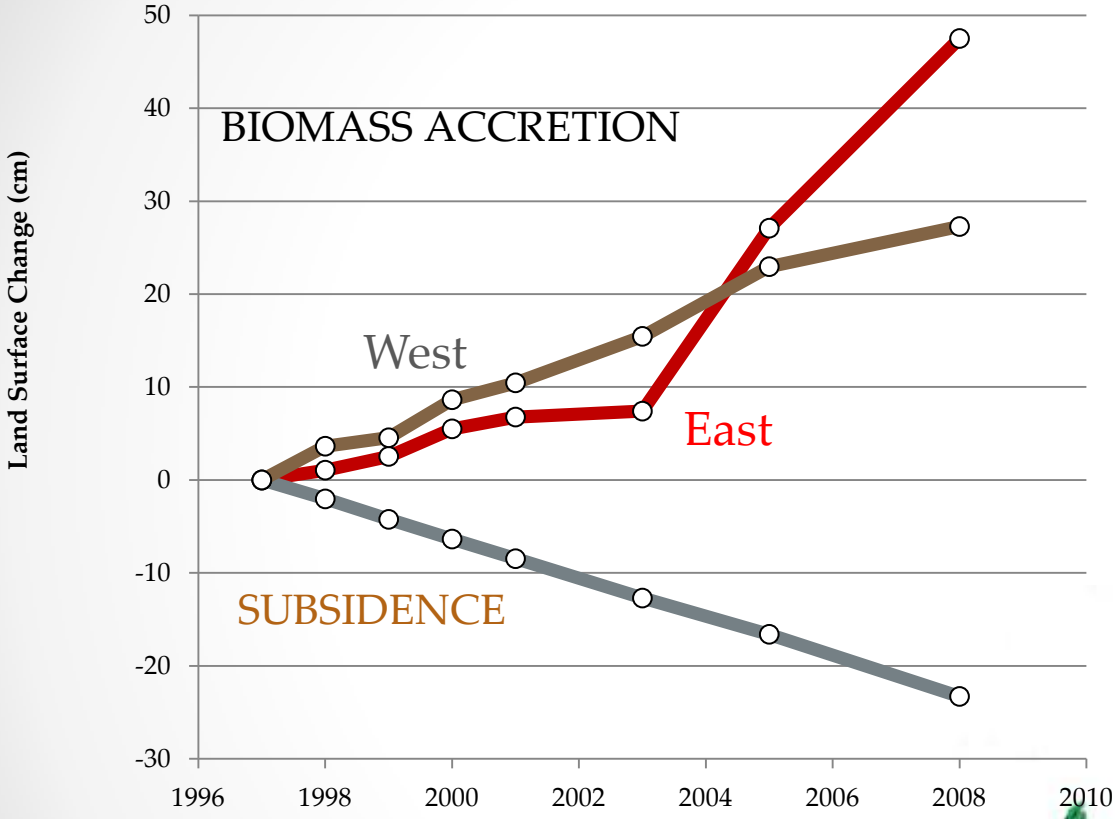
Carbon capture wetlands - Twitchell Island

- Two 7 acre wetlands, established in 1997

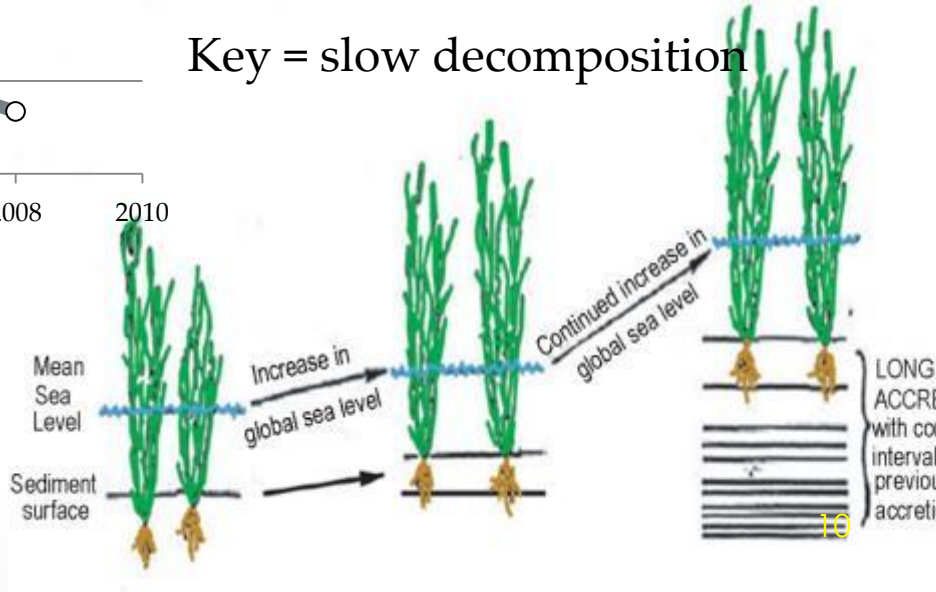


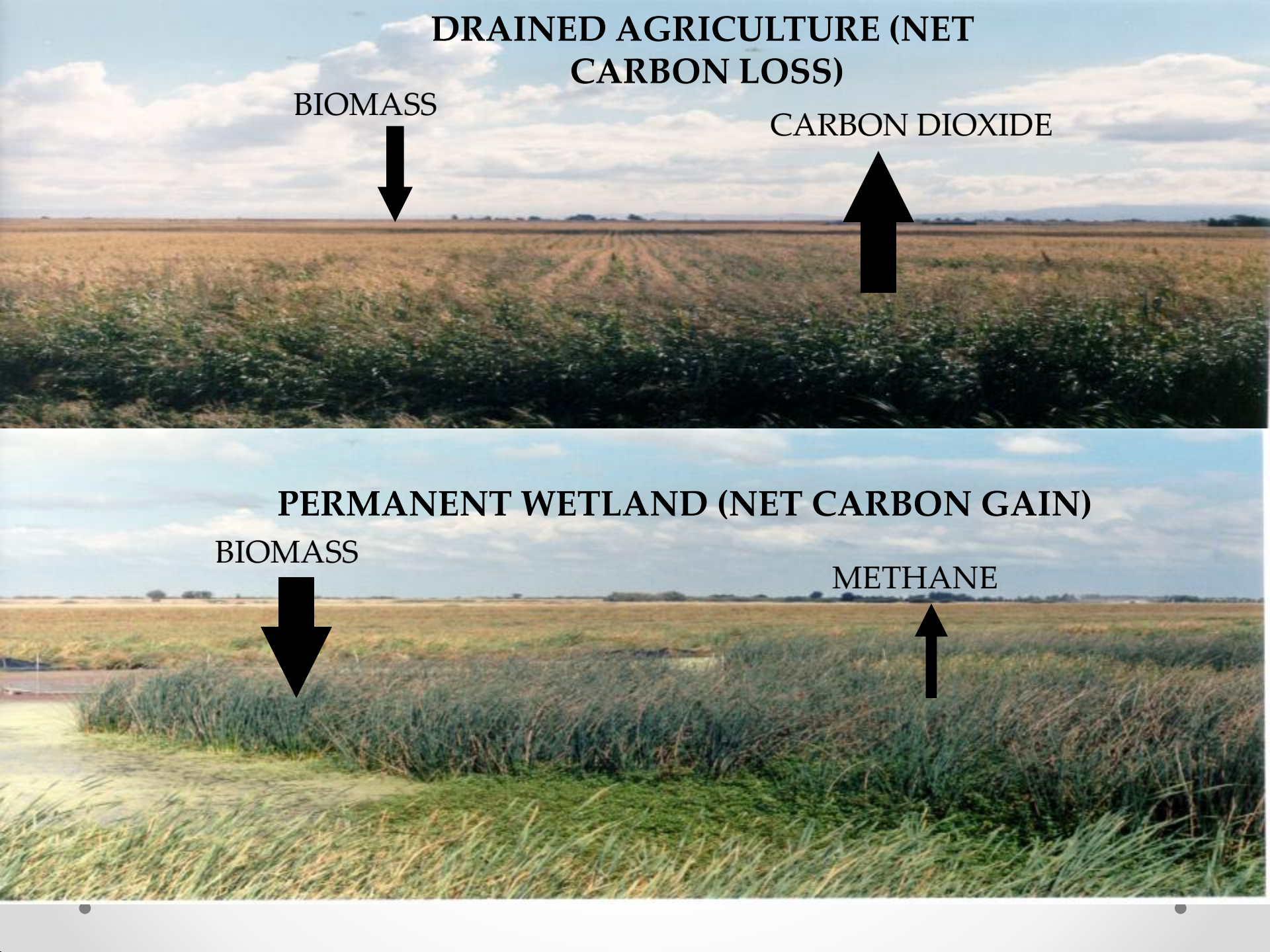
Accreted biomass

Wetland accretion

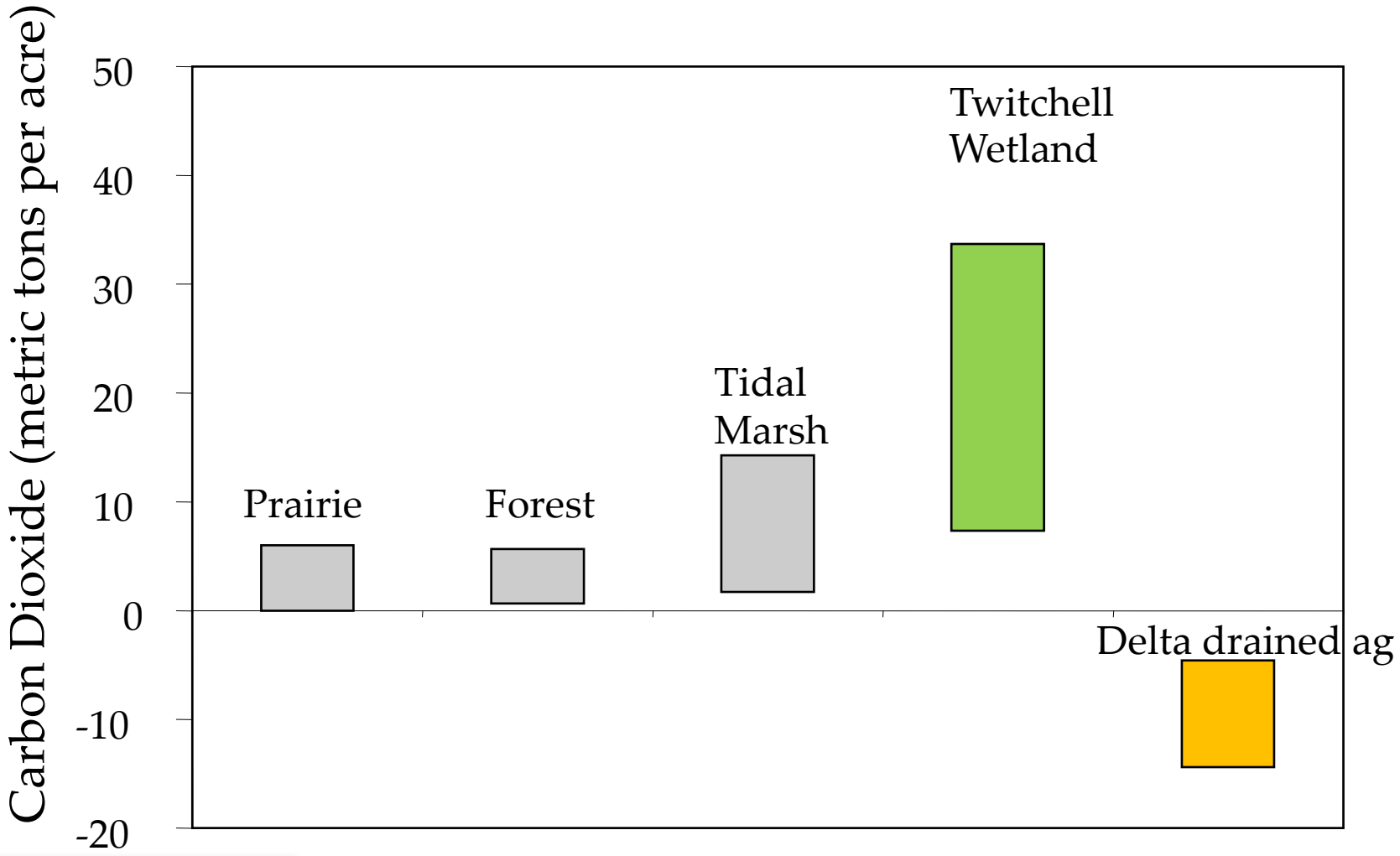


Key = slow decomposition




DRAINED AGRICULTURE (NET CARBON LOSS)
BIOMASS
CARBON DIOXIDE
PERMANENT WETLAND (NET CARBON GAIN)
BIOMASS
METHANE

Productivity comparison



USGS

Economics

- Air Resources Board tasked with reducing California's greenhouse gas emissions.
  - Cap and trade program provides for purchasing eligible verified carbon offsets

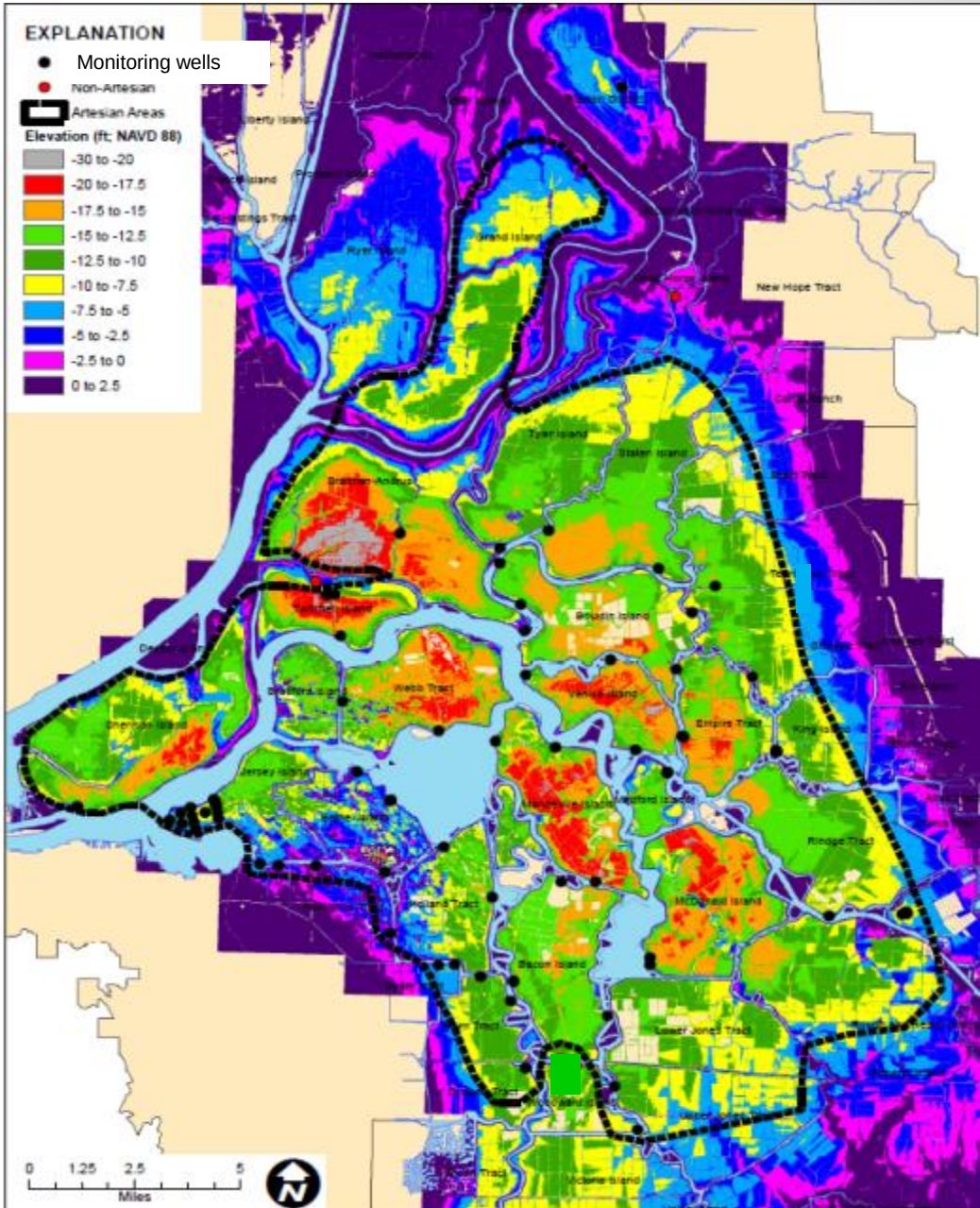
14 MT CO2 per acre per year, varying initial price, 5% increase per year

Initial price ($/ton)	Break even at	Net revenue ($/acre)
$12	38 years	$56
$15	25 years	$183
$25	10 years	$ 209

Recent net revenue for Delta corn ~ $190/acre

Potential in Delta

- ~1.7 million acre-feet below sea level



Rice

- Can rice provide net GHG benefit and stop subsidence?
- Viable crop for Delta?
- Pilot projects and research since 2004
- Stops or greatly reduces subsidence
- Potential GHG benefit

Ongoing

- Methodology development
  - Credible accounting methodologies must be developed and approved.
  - Partnership – DWR, Delta Conservancy, HydroFocus, UC Berkeley, American Carbon Registry, The Nature Conservancy, California Coastal Commission
  - Funding secured
  - Will allow for trading of carbon credits on voluntary market
  - And California compliance market

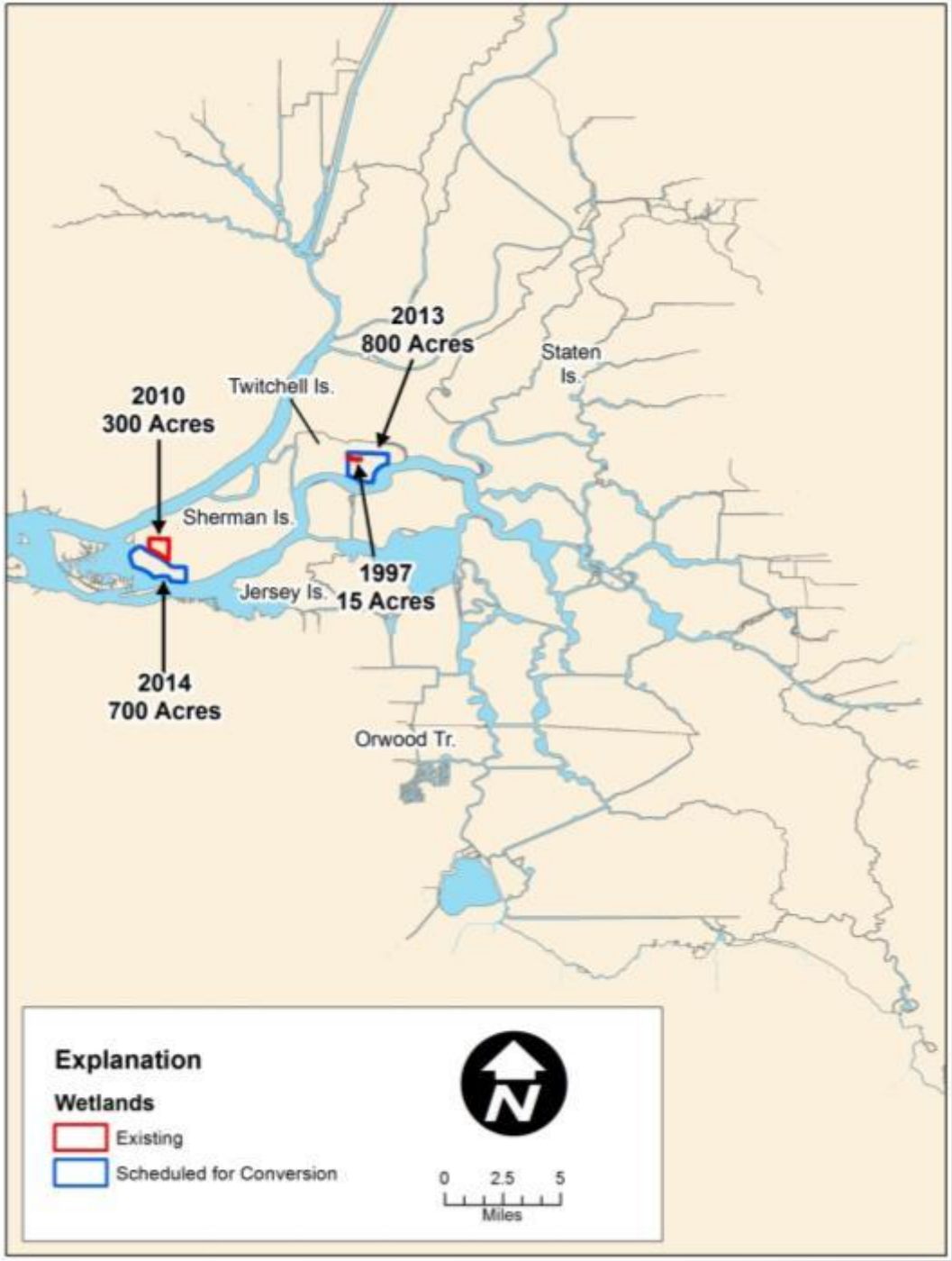
- Wetland and rice projects
  - SSJDC led application process for USDA grant for pilot project on Bouldin Island
  - Ongoing data collection on Sherman, Twitchell and other islands
  - USDA climate research funding for rice

- Input to cap and trade investment strategy for auction revenue

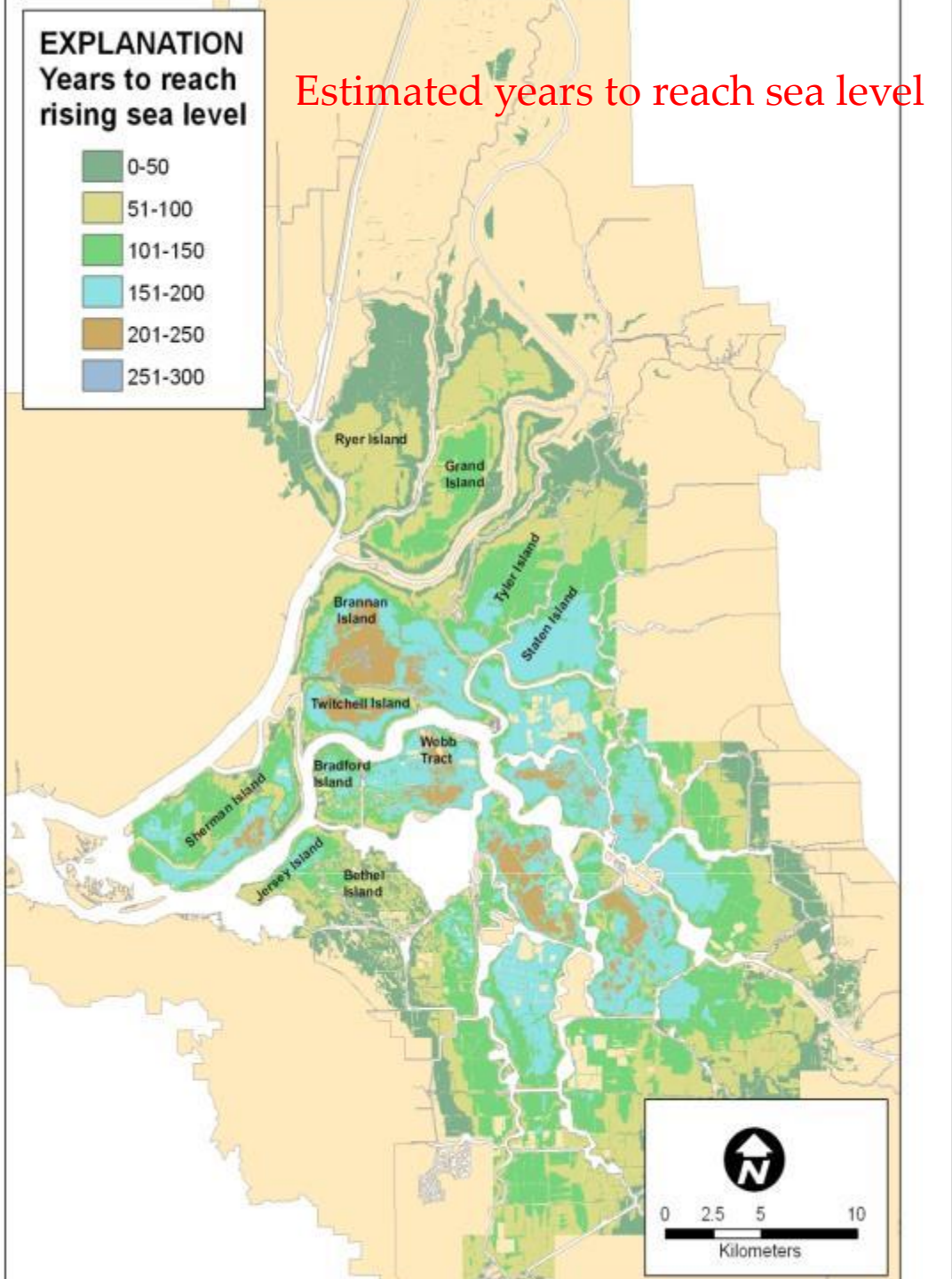
Questions?

Extra slides

Wetlands for Subsidence Reversal, Habitat & Carbon Sequestration

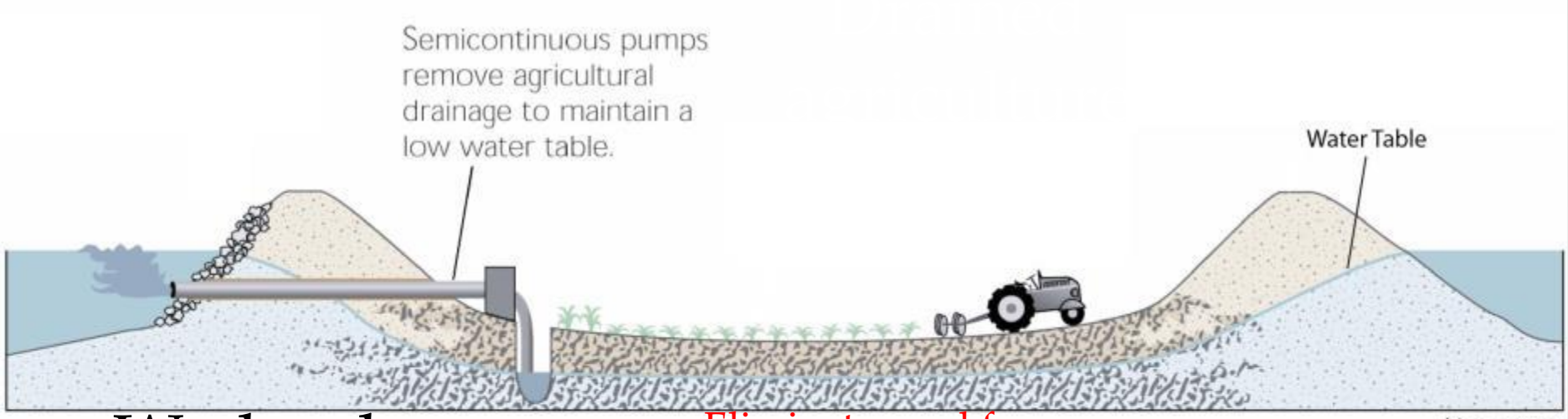


Subsided islands = "accommodation space" for carbon sequestration



from Deverel, SJ, Drexler, JZ, Ingrum, T, and Hart, C. 2013. Simulation of Vertical Marsh Accretion in the Sacramento-San Joaquin Delta, California, USA. Submitted to *San Francisco Estuary and Watershed Science*

Wetland benefits



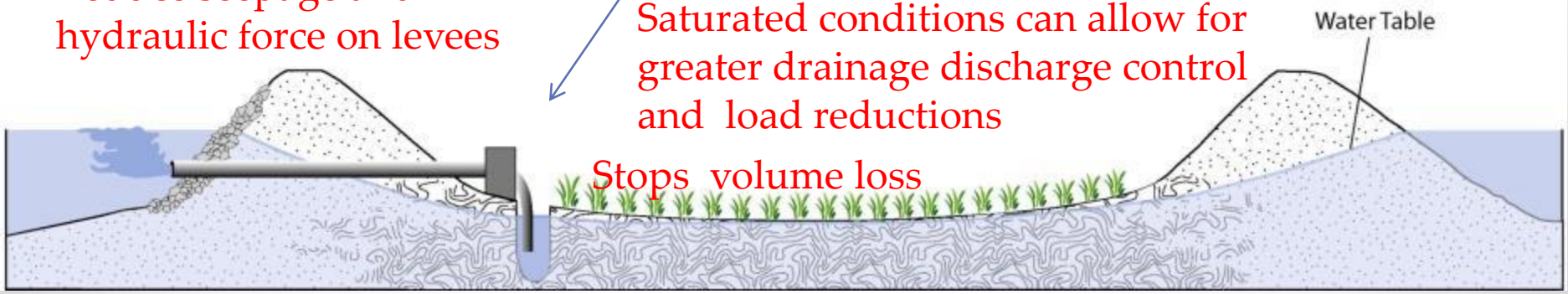
Wetlands

Eliminate need for deepening drainage ditches
Reduces threat to levee stability

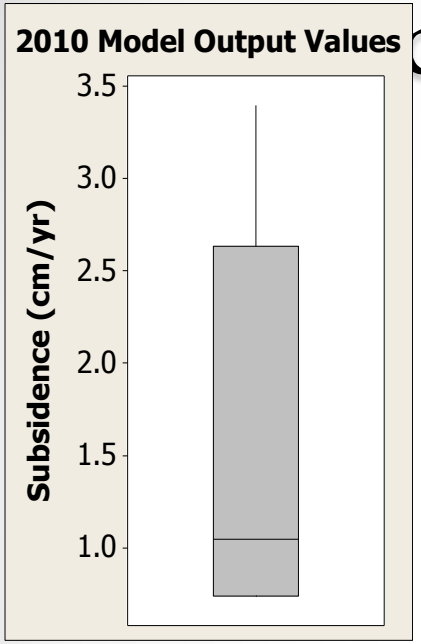
Reduce seepage and hydraulic force on levees

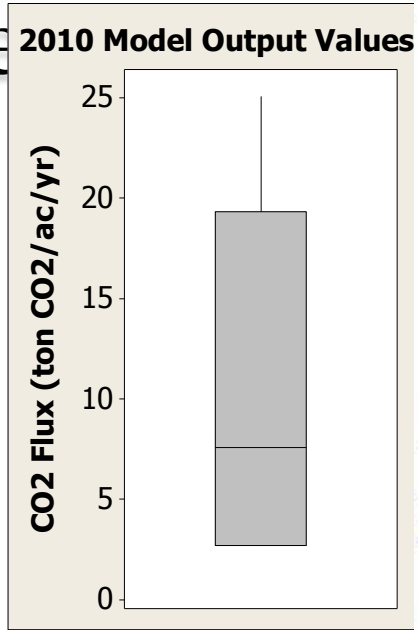
Saturated conditions can allow for greater drainage discharge control and load reductions

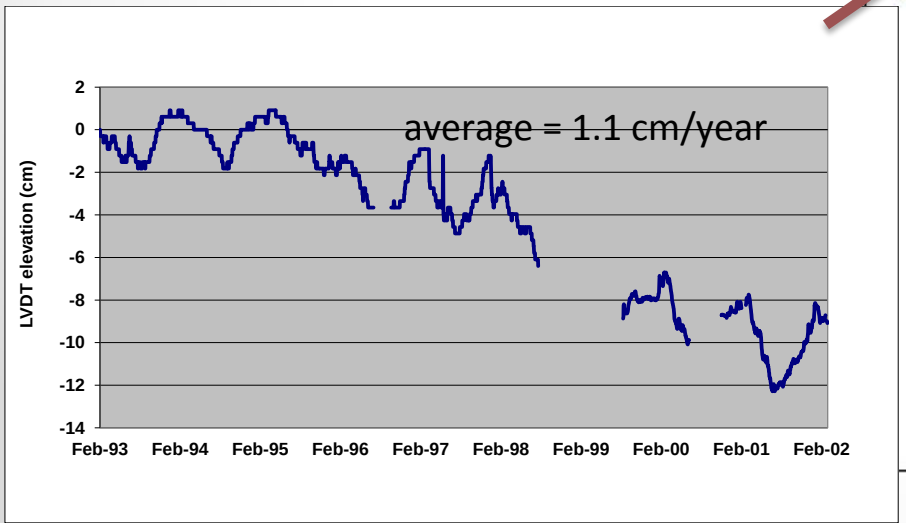
Stops volume loss

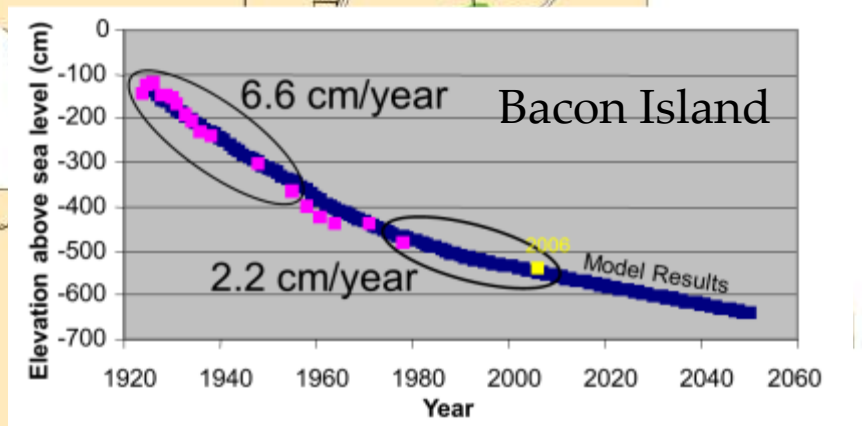


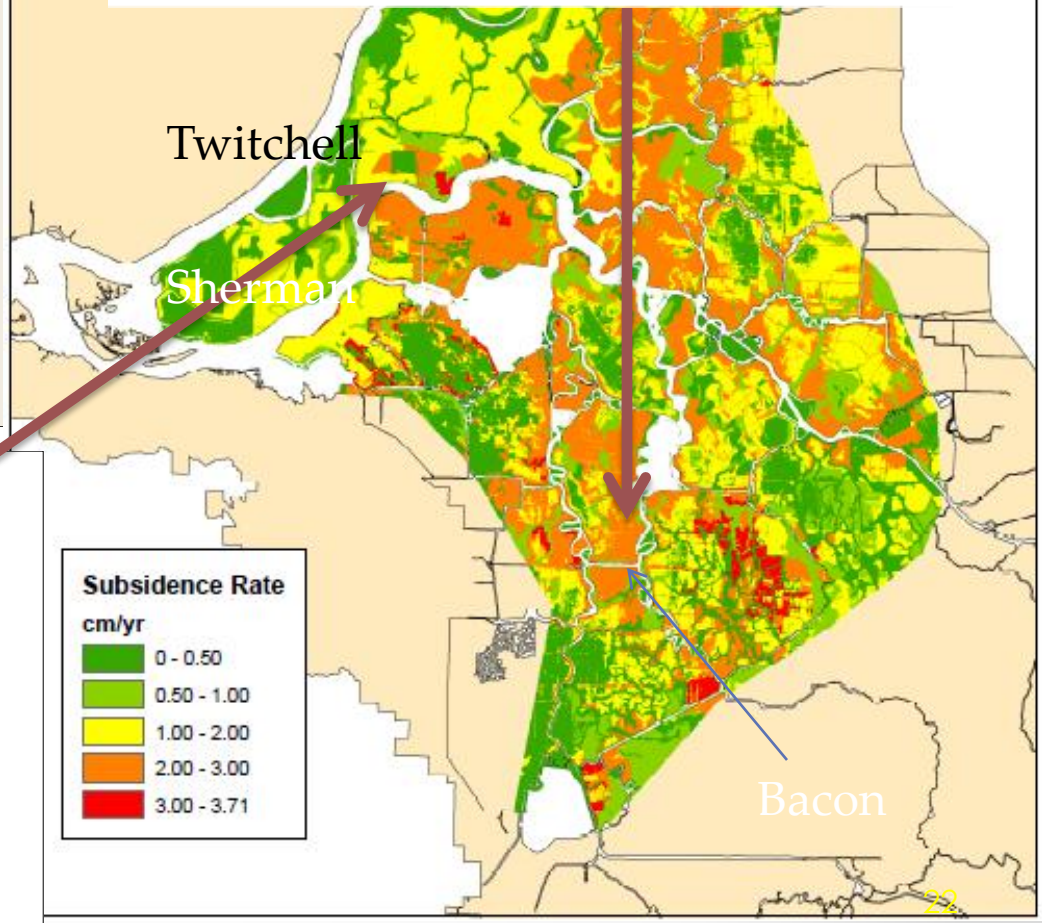
2010 estimated











Estimated Net GHG Benefit

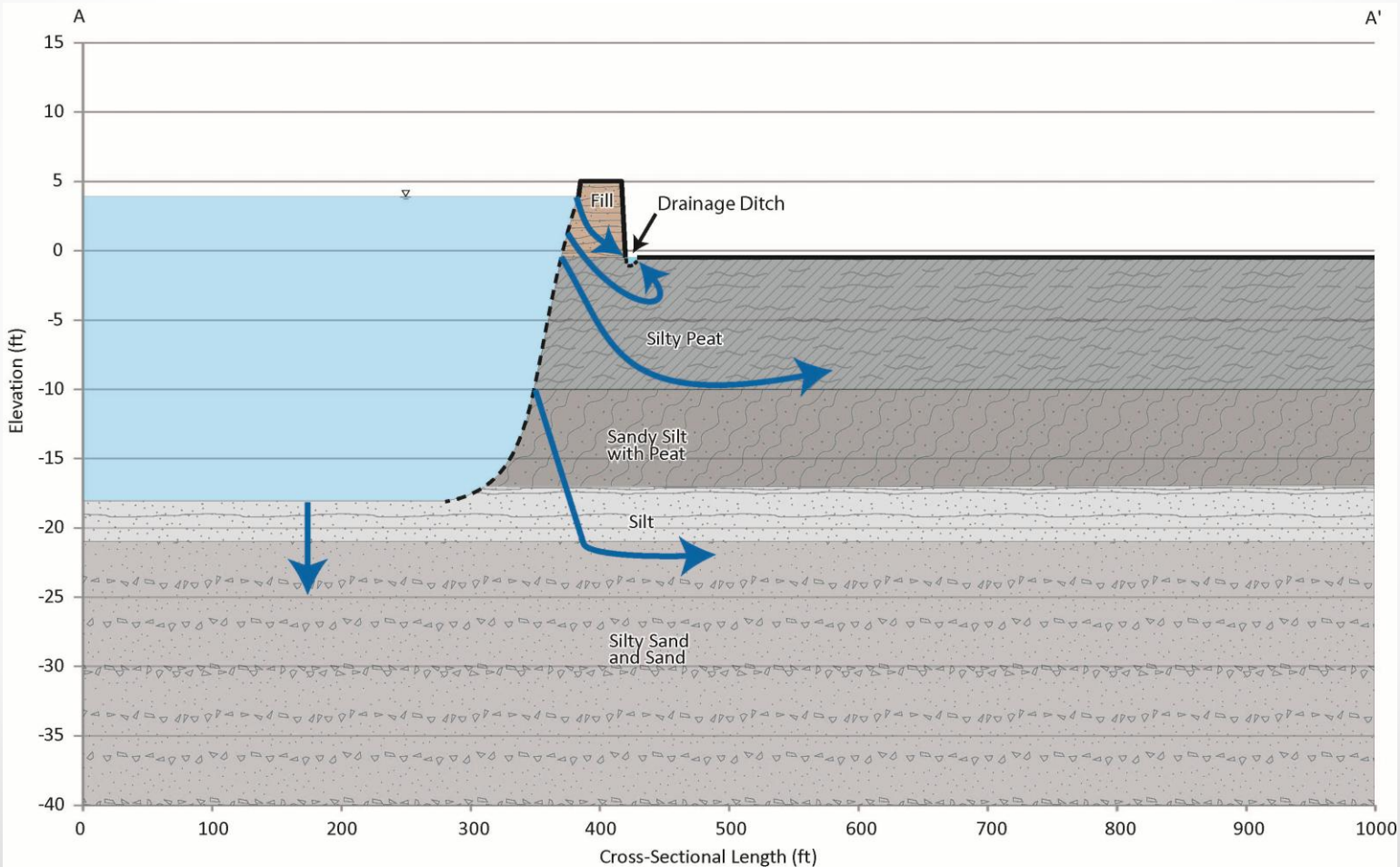
	MT CO_2 equivalent per acre-year
Average carbon sequestration from cores	15
Methane emission[4]	-10 (0.5 ton CH4/A-yr x 21)
Current CO_2 loss due to soil oxidation	9
Net benefit (15 – 10 + 9)	14

Levees: changing seepage hydraulics

Early 1900s

Levees: changing seepage hydraulics

Early 1900s



Changing seepage hydraulics